ESTISOL 140 Drilling Fluid

2013 SAB Meeting

- Proposed ESTISOL 140, rather than Isopar-K, as drilling fluid for South Pole Ice Core (SPICE Core)
- Discussed lab and field tests of ESTISOL 140
  - Field tests very positive
  - Samples provided to U.S. ice core labs. All labs OK with ESTISOL 140, except possibly biology (mixed responses from MSU and LSU labs)
  - Strong odor & aggressive behavior to some plastics and rubbers a concern to some

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Activities Since 2013 SAB Meeting

- SPICE Core PIs **white paper** to SAB, IDPO, NSF outlining rationale for ESTISOL 140 at South Pole
- **Letter from SAB** to IDPO and NSF supporting use of ESTISOL 140
  - Urged communities who might be affected by ESTISOL 140 to conduct additional tests
- **ASC** tested ESTISOL 140 & it is compatible with USAP bulk field camp bladders and traverse bladders
- **Gary Clow** gave **OK** to use ESTISOL 140 at South Pole. No longer concerned about viscosity & its impact on **borehole temperature measurements**
- **IDDO** reviewed tests of ESTISOL 140 on **IDD**, & feel very comfortable with ESTISOL 140
- No other biology tests conducted (to our knowledge)

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Greenland IDD Drill Test

- Approx. April 24 – June 11, 2014
- **ESTISOL 140 purchased** in April 2013
  - 50 drums (~600 m with fluid level at 75 m)
  - delivered to Thule via vessel, **currently en-route to Summit** via GrIT

South Pole Ice Core

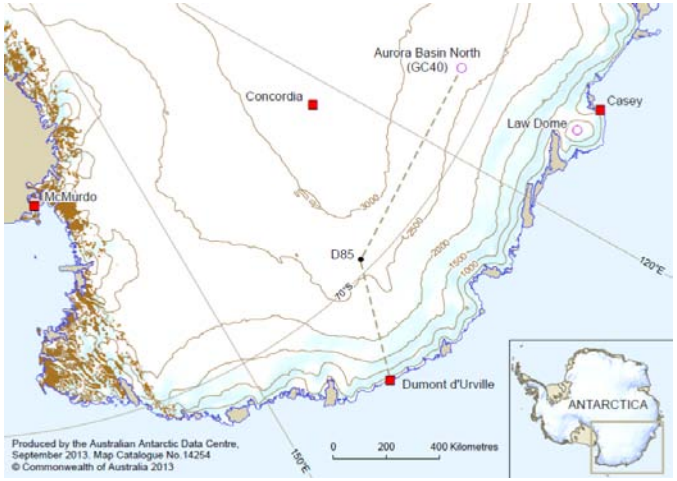
- **ESTISOL 140 purchased** in Oct/Nov 2013 (ASC required drill fluid decision by summer 2013)
  - 140 drums
  - Shipped directly from Denmark to NZ
  - **Delivered to MCM** in Feb 2014 via USAP resupply vessel
  - Store in MCM, fly what we need each season to Pole
    - End of season, remaining drums stored over winter in South Pole Station's Cryo Facility transport bay

ESTISOL 140 Drilling Fluid

Aurora Basin North 2013-14 Drilling

Simon G. Sheldon, Centre for Ice and Climate, Niels Bohr Institute, University of Copenhagen, Denmark

- 303 m core drilled with Hans Tausen Drill & ESTISOL 140 (wet mode)
  - 0-132 m dry drilled
  - 132-303 m wet drilled (ESTISOL 140)
- Drill performance & ice quality excellent at temps from -43.5°C (10 m) to -45.5°C (300 m)
- ESTISOL 140 did not adversely affect materials used in and around drilling ops
  - Baffin polar boots, standard polar suits, other clothing unaffected
  - Water-proof gloves and rubber aprons slowly expanded and eventually replaced
- Didn't use ventilation system bc. prevailing winds so strong
  - Recommend ventilation system at South Pole
- Able to dry clothing and equipment in 20°C generator tent
- Liquid phase fractionation system allowing re-use of 600 L out of the 2000 L placed down hole



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Questions?

Discussion?

ESTISOL 140 Drilling Fluid

Simon G. Sheldon, Centre for Ice and Climate, Niels Bohr Institute, University of Copenhagen, Denmark